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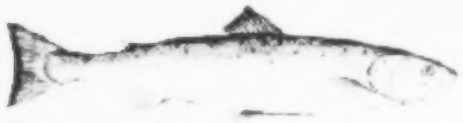
Newfoundland Region

DFO Science
Stock Status Report D2-05



ATLANTIC SALMON

INSULAR NEWFOUNDLAND, SOUTHWEST COAST, SALMON FISHING AREAS 12-13

Background

Salmon Fishing Areas (SFAs) 12 and 13 (Fig. 1) contain a total of 26 scheduled Atlantic salmon (Salmo salar L.) rivers (8 in SFA 12 and 18 in SFA 13). The LaPoile River is the largest river in SFA 12. Humber River is the largest river in SFA 13. Humber River, along with several rivers in the Bay St. George, produce a significant number of large salmon many of which are maiden multi-sea-winter fish. A small run of salmon enters the lower Humber in August and September. The rivers of Bay St. George historically produced among the highest recreational catches of salmon in insular Newfoundland. However, in recent years, the stocks have continued to decline and recent catches have been among the lowest recorded. Concern about the health of these stocks has been expressed since the late 1970s.

The current low abundance of salmon in this area has raised a great deal of concern. As a result, DFO, on the advice of a local working group, (Bay St. George Salmon Working Group) implemented a series of individual river management measures aimed at rebuilding the stocks. These measures were in addition to the moratorium in the commercial salmon fishery and catch and effort controls implemented in the recreational fishery in 1992. Several rivers in SFA 13 have been the focus of salmon enhancement programs in recent years. Hughes Brook was the site of an enhancement program in 1987-92 involving the stocking of Atlantic salmon swim-up fry. Fry were also stocked into North Brook during the same period. Fry were stocked into Flat Bay Brook and Romaines River for the first time in 1995 and 1996. Arctic charr have been reared in cages in Grand Lake and a rainbow trout fish-out pond has operated at Mine Pond, near Stephenville for about ten years.

Conservation for Atlantic salmon is considered to be a threshold reference point. The consequences of egg depositions below conservation to the long-term sustainability of the stock are unknown but the likelihood of deleterious effects are greater when egg depositions are below conservation. The conservation requirements are established for individual rivers based on 2.4 eggs per m^2 of riverine spawning and rearing habitat and 368 per hectare of lake habitat and the amount of salmon rearing habitat in each river system. The status of stocks is assessed on the basis of the proportion of the conservation egg deposition achieved in a given year and the trends in abundance of various life stages.

Figure 1. Newfoundland Region showing the location of Salmon Fishing Areas 12-13.

The Fishery

There was a recreational fishery on all scheduled rivers in SFA 12 and on 14 of 18 scheduled rivers in SFA 13 in 1996. Individual river management measures implemented in 1996 included: 1) complete closure; 2) catch-and-release angling only; 3) river specific quotas; 4) retention angling with voluntary catch-and-release; and 5) shortened seasons. Four SFA 13 rivers were closed to angling in 1996, four were open for catch-and-release only and two rivers were managed by river-specific quotas. The quota of 50 small salmon retained for Fox Island River was reached on 12 July. Rivers remained open for catch-and-release angling after the quota

was reached but were closed to all angling in mid-August due to low water levels and high water temperatures. Two rivers in SFA 12 and eight others in SFA 13 were also closed to angling in mid-August for the same reason. Historically, less than 10% of the total season catch in these rivers was taken after mid-August. All other rivers in SFA 12 remained open for catch and retain angling for the entire season. The only SFA 13 rivers that remained open for the entire season were Grand Codroy River and Little Codroy River in Bay St. George, which had not shown the same declining stock abundance as other Bay St. George rivers, and the Humber River and Goose Arm River in the Bay of Islands.

A fall (3-29 September) catch-and-release fishery was permitted for the first time on the lower Humber River in 1996. The area of Deer Lake known as the Tailrace was closed effective 18 July.

Recreational fishery catch and effort information for 1996 was incomplete for SFA 12 and 13. However, based on the information available, the catch-per-unit-effort (CPUE) was the highest since 1984. Recreational catches of small salmon during the commercial salmon moratorium years (1992-95) were well below those recorded for most pre-moratorium years until 1995 (Fig. 2).

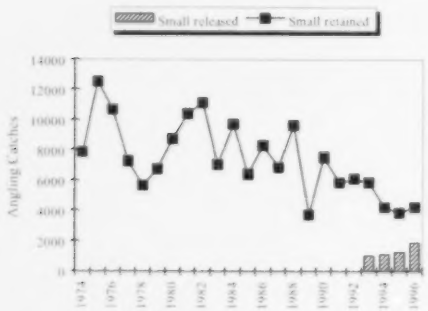


Figure 2. Recreational catches of small salmon in SFAs 12-13 in 1974-96. Note information for 1996 is incomplete.

Resource Status

Returns

Individual river assessments in SFAs 12-13 for 1996 are available for Highlands River, Crabbes River, Middle Barachois River, Robinsons River, Flat Bay Brook, Harrys River, and Humber River. Indices of Atlantic salmon abundance in 1996 were from adult salmon enumerated at counting facilities on Highlands River, Flat Bay River and Pinchgut Brook/Harrys River; spawner surveys on Flat Bay Brook, Crabbes River, Middle Barachois River, Flat Bay River, and Robinsons River; mark and recapture estimates of run size on the Humber River; and smolt counts and juvenile surveys on Highlands River. Where comparable data existed for previous years (Highlands, Pinchgut/Harrys and Humber), the returns of small and large salmon to the rivers in 1996 were either the highest or among the highest on record. This could be indicative of an overall increase in returns to SFAs 12-13 rivers. Compared to pre-moratorium years, returns improved in 1992-96, particularly for SFA 13 rivers. However, estimates of the total population size of small and large salmon (before commercial exploitation) for the Humber River since 1974 indicate a significant decline in recent years with values for 1992-96 being among the lowest.

Information from previous years indicates that there is a run of large salmon entering the Humber River in August and September. This population appears to be a descrete stock which spawns downstream from Deer Lake. There is a small 3SW component which is rare in Newfoundland. The large

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salmon population is probably less than 500 salmon.

The average number (10,883) of smolts counted at the Highlands River counting fence in 1993-95 declined from that recorded during 1980-82 (14,447). The smolt count (12,383) in 1996 increased compared to the 1992-95 mean (10,883). The smolts enumerated prior to 1996 are almost entirely progeny of salmon that spawned prior to the closure of the commercial fisheries in 1992. Smolts in 1996 were predominately three years old and would have been produced by spawners in 1992. Thus the increase in smolt production in 1996 is indicative of a higher spawning escapement in 1992 compared to pre-moratorium years, or improved survival rates. The sea survival of Highlands River smolts in post-moratorium years has been more than double the survival in pre-moratorium years.

Egg Deposition relative to conservation

Only the Humber River and the Pinchgut Brook portion of Harrys River exceeded their conservation egg deposition requirements in 1996 (Fig. 3). Since Pinchgut Brook is a tributary of Harrys River, its conservation egg deposition requirements cannot be treated separately from Harrys River in its entirety. Fry and parr produced in Pinchgut Brook probably distribute to other areas of Harrys River. Based on a spawning survey conducted in the fall of 1996, Harrys River and Flat Bay Brook are estimated to have achieved 51% and 65%, respectively of their spawning requirements in 1996. Fry stocking planned for 1997 may increase Flat Bay Brook stock to 85% of conservation levels. Egg deposition in Crabbes, Middle Barachois, Robinsons, and Highlands rivers ranged from 44% to 81% of conservation requirements.

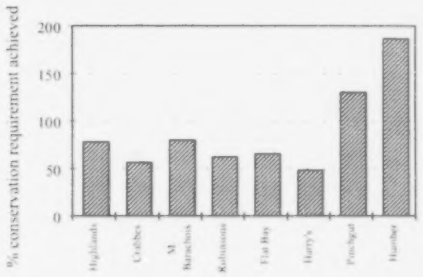

Figure 3. Egg deposition, expressed as a percentage of conservation requirement in Highlands, Crabbes, Middle Barachois, Robinsons, Flat Bay, Harrys, Pinchgut and Humber rivers in 1996.

Environmental considerations

Spring runoff in these rivers is often high and summer flows can vary considerably. These extreme conditions can affect such things as the run-timing of adult salmon, catch rates in the recreational fishery, and, most importantly, have a severe impact on the survival of juvenile salmon which would in turn affect the potential productivity of these systems. The early spring runoff that occurred in SFAs 12-13 rivers in February of 1996 before fry had emerged caused massive substrate movement which may have severely impacted on juvenile salmon survival. The measured densities of all age-classes of parr in Harrys and Highlands rivers in 1996 were well below 1995 values, possibly a result of flood conditions in February. In 1996, a total of twelve rivers in SFAs 12-13 were closed to angling in mid-August 1996 due to low water levels and high water temperatures. These conditions could also have negatively affected juvenile salmon.

Outlook

Short-term

The number of smolts counted on Highlands River in 1996 increased in comparison to 1995, therefore, assuming that the natural survival rate at sea remains the same, returns

of small salmon in 1997 and large salmon in 1998 are expected to be greater than those in 1996.

Assuming that the predominant age of smolts produced by salmon spawners in SFAs 12-13 rivers is three years, the first significant recruitment since the commercial moratorium (in 1992) will return in 1997. On the Humber River in recent years smolts were predominantly three and four years old. Therefore, returns to the Humber in 1997 will have been produced by spawners in 1991 and 1992. There are indications that escapements of large salmon improved markedly during moratorium years; however, the first significant returns of large salmon from these spawners are not expected until 1998. Returns of small salmon to the Humber River in 1997 are anticipated to be the highest since 1992. Potential egg deposition in Humber River should exceed the conservation requirement assuming that that the angling exploitation rate is similar to that observed in 1996. No projections are available for the population of late-run salmon in the lower Humber River.

Long-term

Assuming, there are no negative impacts resulting from the early spring runoff in February, 1996, then future returns are expected to increase. This expectation is based on past spawning escapements, assuming sea survival does not decrease, and angling is kept under control to maintain spawners at appropriate levels.

Management Considerations

Returns of small salmon to Bay St. George are still low. Stocks in SFAs 12 and 13 were not expected to benefit as much from the commercial moratorium as other areas of insular Newfoundland because these stocks were already subjected to a shorter commercial fishing season beginning in 1978, which should have resulted in a lower commercial exploitation.

Catch and effort controls in the angling fishery, while effective in limiting the catch, have not succeeded in meeting conservation requirements in most SFA 13 rivers.

Increased production resulting from the closure of the commerical fishery in 1992 are not expected to begin to occur until 1997 and 1998. This is an important consideration in any discussions that pertain to opening a fall fishery for large salmon on the lower Humber.

Harrys River has not met conservation requirements in recent years. The closure of the river above Home Pool to angling should continue.

Bay St. George rivers, with the exception of Grand Codroy and Little Codroy, have generally experienced poor returns. Severe poaching has been identified as a long standing problem on Harrys River and other rivers in Bay St. George.

Salmon of the lower Humber River should be managed as a unique stock given the apparent later timing of the run to this section of the river, and in consideration of the contribution of a small number of 3SW salmon to the population. Overall, the total population of the Lower Humber River run of large salmon appears to be small, probably less than 500 salmon in 1994-96. Thus, a precautionary approach should be taken in managing the stock, and no increase in fishing mortality on this component is advised at this time.

Summary sheets

More detailed information on individual river assessments for Crabbes, Middle Barachois, Robinsons, Flat Bay Brook, Harrys, and Humber rivers are provided in the summary sheets at the back of this stock status report.

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STOCK: Highlands River (SFA 13) **Drainage area**: 183.1 km^2 (accessible)

CONSERVATION REQUIREMENT: 1.5 million eggs calculated as 2.4 eggs/m^2 of fluvial parr rearing area and 368 eggs per hectare of lacustrine area.

Year	1990	1991	1992	1993	1994	1995	1996	MIN[1]	MAX[1]	MEAN[1]
Total Returns:										
Small	55	29	56	78	148	120	142	29	148	90
Large	82	127	100	137	145	172	199	82	199	137
Recreational harvest[2]					CLOSED SINCE 1978					
Small (retained)										
Large (retained)										
Small (released)										
Large (released)										
Other Moralities										
Small										
Large										
Spawners:										
Small	55	29	56	78	148	120	142	29	148	90
Large	82	127	100	137	145	172	199	82	199	137
Conservation Requirement										
% eggs met	32	26	34	47	86	68	78	26	86	53
Smolt count	15130	15839	12373	9986	10503	12160	12383	9986	15839	12625
Sea Survival	1.2%			2.7%	2.8%	3%		1.2%	3%	2.4%

[1] Min, max and mean are for 1980-82 and 1993-96.
[2] River has been closed to angling since 1978.

Data and methodology: Counts of smolt and adult salmon were obtained with a fish counting fence in 1980-82 and in 1993-96. Juvenile densities were measured at 19 stations to determine changes in juvenile salmon production. Juvenile studies at the higher egg depositions following the moratorium will give a better estimate of the potential production of different reaches and a more accurate estimation of the required egg deposition for conservation.

State of the stock: The large salmon component has recovered since the closure of the commercial fishery, and now forms 45% from the preceeding smolt run, compared to only 26% of the run a decade and a half ago. Potential egg depositions are approaching the conservation requirement. Repeat spawners may now form 40% of the large salmon component.

Forecast: Given present sea-survival rates, 164 large salmon and 195 grilse are expected to return in 1997, achieving about 86% of the conservation egg requirements.

STOCK: Crabbes River (SFA 13) **Drainage area**: 551 km^2

CONSERVATION REQUIREMENT: 4.6 million eggs (spawners not defined) calculated as 2.4 eggs/m^2 of fluvial parr rearing area and 368 eggs per hectare of lacustrine area.

Year	1991	1992	1993	1994	1995	1996	MIN[1]	MAX[1]	MEAN[1]
Total returns									
Small	243	682	354	774	N/A	592-844	111	1919	674
Large	32	126	34	113	N./A	144-239	15	359	138
Recreational harvest									
Small (retained)	103	263	150	174	26	N/A	47	561	235
Large (retained)[2]	0	0	0	0	0	0	14	127	81
Small (released)	-	26	0	37	5	N/A	-	-	-
Large (released)[3]	9	88	24	45	32	N/A	0	25	9
Other mortalities									
Small									
Large									
Spawners[4]									
Small	140	393	204	600	N/A	592-844	64	1355	439
Large	32	126	34	113	N/A	144-239	15	270	92
Conservation requirement									
% eggs met	7	34	13	41	N/A	44-68	3	55	21

[1] Min, max and mean are for the period 1974-91.
[2] Min, max and mean for large salmon retained is for 1974-83.
[3] Min, max and mean for salmon released is for 1984-91.
[4] Hook and release mortality is 10% of released salmon

Data and methodology: Visual counts of salmon were made by swimmers in late August, 1996. An adjustment factor was applied to the visual counts to give a maximum number of salmon in the river. For years prior to 1995, the assessment was based on applying an angling exploitation rate to the recreational catches.

State of the stock: In 1996, Crabbes River achieved between 76 % and 81% of its egg deposition required for conservation. This estimate is the highest achieved since 1980. This stock has been at very low population size and has not achieved its conservation requirements in the past 15 years.

Forecast: There is no forecast of abundance for 1997.

STOCK: Middle Barachois River (SFA 13) **Drainage area**: 241 km^2

CONSERVATION REQUIREMENT: 2.1 million eggs (spawners not defined) calculated as 2.4 eggs/m^2 of fluvial parr rearing area and 368 eggs per hectare of lacustrine area.

Year	1991	1992	1993	1994	1995	1996	MIN[1]	MAX[1]	MEAN[1]
Total returns									
Small	179	584	665	732	N/A	755-805	134	1619	675
Large	28	72	36	81	N./A	34-36	0	1159	132
Recreational harvest									
Small (retained)	68	222	230	154	53	N/A	51	526	207
Large (retained)[2]	0	0	0	0	0	0	0	117	42
Small (released)	-	0	23	25	2	N/A	-	-	-
Large (released)[3]	6	22	11	14	24	N/A	0	23	7
Other mortalities									
Small									
Large									
Spawners[4]									
Small	111	362	435	578	N/A	755-805	83	1329	468
Large	28	72	36	81	N/A	34-36	0	1057	108
Conservation requirement									
% eggs met	12	53	48	74	N/A	76-81	9	254	49

[1] Min, max and mean are for the period 1974-91,
[2] Min, max and mean for large salmon retained is for 1974-83.
[3] Min, max and mean for salmon released is for 1984-91.
[4] Hook and release mortality is 10% of released salmon

Data and methodology: Visual counts of salmon were made by swimmers in late August, 1996. An adjustment factor was applied to the visual counts to give a maximum number of salmon in the river. For years prior to 1995, the assessment was based on applying an angling exploitation rate to the recreational catches.

State of the stock: In 1996, Middle Barachois River achieved between 76 % and 81% of its egg deposition required for conservation.. This estimate is the highest achieved since 1980. This stock has been at very low population size and has not achieved its conservation requirements in the past 15 years.

Forecast: There is no forecast of abundance for 1997.

STOCK: Robinsons River (SFA 13) **Drainage area**: 439 km^2

CONSERVATION REQUIREMENT: 3.3 million eggs (spawners not defined) calculated as 2.4 eggs/m^2 of fluvial parr rearing area and 368 eggs per hectare of lacustrine area.

Year	1991	1992	1993	1994	1995	1996	MIN[1]	MAX[1]	MEAN[1]
Total returns									
Small	415	967	531	910	N/A	659-768	274	3186	1234
Large	32	130	31	115	N./A	102-120	21	733	176
Recreational harvest									
Small (retained)	176	386	225	160	73	N/A	116	905	422
Large (retained)[2]	0	0	01	0	0	0	0	117	68
Small (released)	-	24	0	88	38	N/A	-	-	-
Large (released)[3]	10	75	18	38	23	N/A	0	37	16
Other mortalities									
Small									
Large									
Spawners[4]									
Small	239	557	306	750	N/A	659-768	158	2281	812
Large					N/A	102-120	21	604	137
Conservation requirement									
% eggs met	13	57	23	65	N/A	57-67	9	174	50

[1] Min, max and mean are for the period 1974-91,
[2] Min, max and mean for large salmon retained is for 1974-83.
[3] Min, max and mean for salmon released is for 1984-91.
[4] Hook and release mortality is 10% of released salmon

Data and methodology: Visual counts of salmon were made by swimmers in late August, 1996. An adjustment factor was applied to the visual counts to give a maximum number of salmon in the river. For years prior to 1995, the assessment was based on applying an angling exploitation rate to the recreational catches.

State of the stock: In 1996, Robinsons River achieved between 57% and 67% of its egg deposition required for conservation. This estimate is the highest achieved since 1984. This stock has been at very low population size and has not achieved its conservation requirements in the past 15 years.

Forecast: There is no forecast of abundance for 1997.

STOCK: Flat Bay River (SFA 13) **Drainage area**: 635 km²
CONSERVATION REQUIREMENT: 3.8 million eggs

Year	1991	1992	1993	1994	1995	1996	MIN	MAX	MEAN
Total returns[1]:				470	598	1365	470	1365	811
Small				403	557	1233	403	1233	731
Large				67	41	132	41	132	80
Recreational harvest[2]									
Small (retained)[3]	251	211	173	128	0	0	72	609	287
Large (retained)									
Small (released)	N/A	12	0	8	0	0	0	12	4
Large(released)	2	20	17	32	0	0	0	32	12
				6	4	109	0.2	109	21
Other mortalities[2]									
Small				6	4	95	0	95	18
Large				0	0	14	0	14	4
Brood stock removals[1]:	-	-	-	43	83	87	43	87	71
Conservation requirement % eggs met[1]	-	-	-	27	45	65	27	65	46

[1]MIN, MAX period from 1994-96.
[2]MIN, MAX period from 1991-96.
[3]MIN, MAX period from 1974-96.

Methodologies: Habitat includes $1.6x10^4$ units. Conservation requirements are to come from small and large salmon. Biological characteristics and fecundity used were those of Flat Bay stock. Total returns (1994-95) are based on a fence count and angling below the fence. The 1996 returns were based on a snorkelling survey conducted in late August 1996.

Broodstock requirements: 87 at present.

Recreational catches: The Flat Bay River stock has been under quota since 1986 as follows: 1986 = 400 small; 1987-88 = 300 small; and 1989-94 = 250 small. The quota has only been achieved in two years. The recreational fishery has been closed since 1995.

State of the stock: The 1996 snorkelling survey counted more fish than the fence count in 1996. This was partially due to a fence washout in mid-season.

Forecast: No quantitative forecast available at this time.

STOCK: Harrys River (SFA 13) **Drainage area:** 816 km^2

CONSERVATION REQUIREMENT: 7.8 million eggs (~ 4,068 small and 92 large salmon) is based on 2.4 eggs/m^2 of fluvial area and 368 eggs per ha of lacustrine area.

Year	1991	1992	1993	1994	1995	1996	MIN[1]	MAX[1]	MEAN[1]
Returns to Pinchgut Brook fence:									
Small	.	222	576	563	752	601	222	752	528
Large	.	5	43	47	28	38	5	47	31
Angling catch above fence:									
Small (retained)	26	10	28	18	3	0	3	28	19
Small (released)	0	0	1	10	2	0			
Large (released)	.	1	0	0	0	0	0	0	0
Spawning escapement on Pinchgut Brook:									
Small	.	212	548	545	749	601	212	749	513
Large	.	5	43	47	28	38	5	47	31
Estimated spawning escapement:									
Small + Large	.	529	1441	1444	1895	1936	529	1895	1138
Conservation requirement [2]									
% eggs met									
Small + Large	.	12	37	46	48	52	12	48	32

[1]MIN, MAX, MEAN are for 1992-95.
[2] % of conservation requirements achieved are updated from the 1995 report based on revised habitat values, biological characteristics and estimated spawning escapement on Harrys River. Conservation egg requirement is preliminary because it includes only lake areas >5 ha.

Methodology: Fluvial habitat includes 2,639,400 m^2 and lacustrine habitat includes 4,068 ha (preliminary - includes all lakes >5ha). Potential egg depositions were calculated from spawning escapements based on 1,540 eggs per kg of body weight of female salmon. The total spawning escapement on Harrys River was estimated based on the spawning escapement on Pinchgut Brook. Potential egg depositions on Harrys River by small salmon in 1992-96 were based on biological characteristics collected in the recreational fishery and at the counting fence in 1992-94. For large salmon, biological characteristics were based on samples collected on other Bay St. George rivers in 1953-94. Spawning escapement for Pinchgut Brook was derived from total returns by subtracting angling removals which include retained catches and a 10% mortality rate for released catches.

Recreational fishery: In the mid 1960s, Harrys River produced the largest recreational catches of any river in Bay St. George but catches began to decline in the 1970s and 1980s. The fishery has been controlled by a river quota of 350 small salmon since 1987 and in-season reviews in 1994-95. The retention fishery was closed in 1994-95 as a result of the in-season review and in 1992-93 due to quotas being reached (1992-zonal; 1993-river). The recreational fishery in 1996 was limited to hook-and-release angling only and angling was not permitted in the headwaters upstream from Home Pool at the outflow of Georges Lake. Recreational angling statistics were not collected in 1996.

Data and assessment: Assessment of the stocks in Harrys River in 1992-96, included the operation of a counting fence on Pinchgut Brook in 1992-96; a spawning survey in November 1995 and November 1996, and a mark-recapture experiment in July 1995. The redds counted on Pinchgut Brook in 1996 was 36% of Harrys River, 12% less than in 1995 (41%). The total spawning escapements on Harrys River in 1992-95 were estimated based on the total spawning escapement on Pinchgut Brook adjusted by the proportion of redds counted on the Pinchgut system in 1995. The total spawning escapements on Harrys River in 1996 was estimated based on the total spawning escapement on Pinchgut Brook adjusted by the proportion of redds counted on the Pinchgut system in 1996. The returns estimated in 1995 based on tagging was similar to the estimate based on the spawning survey results.

State of the stock: Spawning escapements on Harrys River appear to have increased slightly in the last five years but have been less than 50% of the spawning requirement based on this assessment.

STOCK: Humber River (SFA 13) **Drainage area:** 7,679 km^2

CONSERVATION REQUIREMENT: 28.3 million eggs (~15,749 small and 934 large salmon) is based on 2.4 eggs/m^2 of fluvial area and 368 eggs per ha of lacustrine area.

Year	1991	1992	1993	1994	1995	1996	MIN[1]	MAX[1]	MEAN[1]
Recreational harvests									
Small (retained)	1431	4349	4161	2523	5150	5042	1217	6147	3268
Small (released)	.	194	601	463	705	1350	.	.	.
Large (released)	11	177	112	166	233	237	10	303	100
Returns[3]:									
Small	5724	17571	18477	7995	27898	30445	4868	24588	13074
Large	401	2945	636	1030	2064	2679	341	2945	915
Estimated spawning escapement:									
Small	4293	13222	14316	5472	22748	26478	3651	18441	9805
Large	401	2945	636	1030	2064	2524	341	2945	850
Conservation requirement % eggs met:									
Small + Large	27	117	96	40	129	186[4]	24	119	63

[1] MIN, MAX, MEAN are for 1974-91.
[2] Angling catch of small salmon in 1992-96 is estimated based on a creel survey conducted at Big Falls.
[3] Total returns for 1974-91 were estimated based on an angling exploitation rate of 25% adjusted for tag loss and reporting rate.
[4] Preliminary data based on tags returned up to January 06, 1997.

Methodology: Fluvial habitat includes 11.5 million m^2 and lacustrine habitat includes 1,751 ha (excluding Deer Lake - 5930 ha). Biological characteristics were based on samples from the recreational fishery and from the tagging trap located in the estuary of the Humber River. Returns of small salmon are currently estimated by mark-recapture method. Returns of large salmon are assumed to equal returns of small salmon multiplied by the ratio of large to small salmon in the tagging traps. Returns of small salmon in 1992 were based on an angling exploitation rate derived from tags recovered at the Big Falls section of the river by DFO creel survey personnel. The estimate of exploitation rate reported in 1992 had not been adjusted for tag loss but the current value for 1992 includes this adjustment based on a tag loss rate of 23%. Spawning escapement in 1996 was derived from total returns by subtracting angling removals which include retained catches and a 10% mortality rate for released catches.

Recreational fishery: The Humber River produces about 40% of the small salmon catch in SFA 13. Recreational catches estimated in 1992 and 1993 were among the highest on the river since the early 1980s. The recreational catch of small salmon (retained) in 1996 was similar to that of 1995.

State of the stock: The mean potential egg deposition in 1974-91 represented about 63% of the conservation requirement. The 1992-95 mean was 95% requirement. The mean potential egg deposition in 1996 represented 186% of requirement, 31% above the 1995 level. The status of the stock in 1996 was the best since the commercial salmon moratorium and since 1974. The increases in percentages of conservation requirement met since the commercial moratorium has given a false impression that the status of stocks have improved relative to long-term abundance. Assessments of this river has shown that this is not the case.

Forecast: Assuming that the total angling exploitation on the Humber River in 1997 remains at the current level, similar to that in 1995 and 1996, the spawning escapement in 1997, based on trend analysis, is expected to exceed the conservation spawner requirement. Approximately 50% will be produced from spawners in the first year of the commercial moratorium.